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New generation antibiotics-antimicrobial activities of phosphonium containing polynorbornenes

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Phosphorus containing materials have a wide variety of industrial applications such as dispersants, corrosion inhibiting agent and flame retardancy. Recently, they have been found to be effective for biomedical applications as well, such as dentistry, drug delivery and tissue engineering. Phosphorus containing cationic polymers are also shown to have antimicrobial properties similar to well known cationic ammonium polymers. Previously, we synthesized various phosphonium salt containing homopolymers and measured their antibacterial activities. In this study, ROMP (ring opening metathesis polymerization) was used for the preparation of phosphonium based copolymers as a controlled polymerization technique. It was observed that the biological activity of the polymers with an aromatic groups

substituents had an MIC of 16, 8, 64 and 128 $\mu\text{g mL}^{-1}$ against *E. coli*, *S. aureus*, *M. tuberculosis* and *C. albicans*, respectively, while those with nonaromatic carbons had a higher MIC when compared to those with aromatic carbons. The aromaticity of the repeat unit was observed to have impressive effects on hemolytic activities as well. Zeta potential measurements of *E. coli* incubated with active and inactive polymer concentration let the establishment of a relation between the MIC and membrane surface charge density. Polymers bearing aromatic groups killed the bacteria with a widespread damage after the polymers holding the threshold concentration addition to the bacteria.

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